

FlexDisplay Gage Interface & Remote Display

***Remote display with Go/No Go for Digimatic (Mitutoyo),
OptoRS232, and other Serial Devices***



Configuration Guide Version 1.0



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General Description

Your FlexDisplay comes complete with power supply and serial cable (or USB cable depending on version) to connect directly to a computer.

*Note: See **USB Connection** in appendix for connecting your FlexDisplay output to USB ports on your PC.*

Front Panel:

Port Readout - 8 digit display:

Numeric display of up to 8 digits. (FD-2M has 2 digital displays)

Port Go/No Go LEDs:

Located over the numeric display 3 LEDs for indicating reading status.

These LEDs indicate the status for the CURRENTLY displayed port/gage.

-NG: Indicates reading is lower than low specification limit.

GO: Indicates reading is within upper and lower specification limits.

+NG: Indicates reading is above upper specification limit.

Master Go/No Go LEDs:

Located on the right side of the numeric display 2 LEDs indicate reading status. These LEDs indicate the status for the OVERALL part; it is a combined status for ALL dimensions selected as critical for Master Go/No Go. (So if measuring 4 dimensions and any 1 dimension goes out of specification, the MASTER will indicate NG.)

GO: Indicates reading is within upper and lower specification limits for all dimensions.

NG: Indicates reading is outside of specification limits on one or more dimensions.

Rotary Dial:

Rotary dial to select which gage input or calculated (virtual) port to display (FD-2M does not have rotary dial, it has 2 inputs and 2 digital displays).

Data Send Button: *Data send button to send readings to PC. This can be configured to send all readings being captured or only the reading displayed.*

Zero Button: *Zero button to reset reading to zero. This can be configured to Zero all readings being captured or only the reading displayed.*

FLEXDISPLAY Gage Interface

Back Panel:

DB25 Female connector for RS232 Output:

Serial port (DB25F) for RS232 data communications. Serial data is sent through this port to PC for data collection. (This is also where the RS232 to USB cable is connected for USB connection to PC)

DB9 Male connector for Pass-Thru Port:

Additional input (DB9M) for extra gage or to connect multiple units to PC.

Note: See **Pass-Thru Port** in appendix for more details on connecting to this powerful input.

DB15 Female connector for I/O:

Additional input/output connector for easy connection of external alarms/alerts and interactions with PLC.

Note: See **I/O Port** in appendix for more details and tips on connecting to this connector.

GDS input jack:

Global Data Send input with 2.5mm 'headphone' style jack. Operators use with footswitch or handswitch input to trigger readings. (Closing contacts will trigger reading).

Power jack:

Input for power supply. Each interface is shipped with a 7-9vdc power supply with center positive plug.

LED:

Power LED will automatically light when power is applied.

Reset button:

Pressing button will reset the internal CPU of the FlexDisplay to a known state.

Installation

Designed for use right out of the box, operators connect gage cables and power supply to the interface and begin collecting data immediately. The FlexDisplay does not use internal or external dipswitches but is controlled by firmware built into each FlexDisplay. This means there is no software you need to maintain or load onto your computer. Whether using the FlexDisplay in standard mode or utilizing one of the many advanced features available, all controls are built into every FlexDisplay.

Connecting FlexDisplay to computer – Easy as 1,2,3

1. Connect output of FlexDisplay to serial port on PC.
Using the RS232 serial cable (DB9F/25M) provided with your interface, connect the DB25M to the RS232 output on the back of the FlexDisplay Interface and the DB9F to an available port on your PC.

*Note: See **USB Connection** in appendix for connecting your FlexDisplay output to USB ports on your PC.*

2. The default input type for the FlexDisplay is Mitutoyo Digimatic Code. This gage output format is standard from most Mitutoyo brand gages and many other common gage types as well. Cables to connect to these and most other gage types are available from Midwest FlexSystems, Inc.

Connect gages to FlexDisplay.

- a: Using the appropriate gage cable, plug into the desired gage as required.
 - b: Connect the other end of cable (10 pin) into the FlexDisplay.
3. Connect power supply output to FlexDisplay and plug power supply into outlet.
Make sure all connections are secure and that computer and gages are powered.

That's it! Gage readings are immediately displayed and ready to be sent to your PC !

Remember that your FlexDisplay can give operators Go/No Go status based on your specifications. Checking and sorting parts has never been easier! Immediate and right on the shop floor operators can see the Master Go/No Go and can decide to send the part on or send it to rework.

All specifications are stored internally in the FlexDisplay. Part status can be seen on the FlexDisplay front panel or it can be connected to external lights or to PLC's for automatic part sorting.

Note:

See **Firmware Configuration** to customize the FlexDisplay to match any data collection project.

Firmware Configuration

The FlexDisplay comes with built-in features unmatched by any other interface. The firmware inside the FlexDisplay allows standard data collection or customization that is unsurpassed by even dedicated hardware.

To setup advanced features of the FlexDisplay line of interfaces, you can simply use ANY terminal program to access the built-in configuration menu. (Microsoft includes Terminal in Win3.1 and HyperTerminal in Win 95/98/2000/NT/XP)

The firmware will allow you to configure the many options available in the FlexDisplay interface line. By configuring the Upper and Lower Spec limits you can get immediate feedback on part status. Global settings for data format and speed are also configurable for complete customization.

Start HyperTerminal Software

Select the serial port the interface is physically attached to on the PC and set serial settings to match output settings of the FlexDisplay (printed on bottom of unit). The default settings of most units are 9600 baud, no parity, 8 data bits, 1 stop bit. The Flow control needs to be set to NONE.

Access FlexDisplay firmware

Type: SPC

The main menu of the FlexDisplay will be displayed in the window.

Follow on-screen instructions to setup

This setup routine allows advanced or custom features to be accessed.

Features to configure include gage type connected, specification limits, data sending sequence, optional features for individual ports, and special features for the overall interface performance.

Custom applications:

The FlexDisplay includes many features that are exclusive to the line as well as the ability to be customized in the field for special applications. Features can be combined to create a custom interface or if you want to create a special application; advanced functions can be programmed and added to the interface. Contact your FlexDisplay representative to inquire about special or custom applications.

Example: FlexDisplay Main Menu Screen

FlexDisplay Universal Interface Setup				Version 3.0
Port#	Gage Type(G)	USpec/LSpec(S)	Master	Options(O)
01	Mitutoyo	0.0000/0.0000	N	--
02	Mitutoyo	0.0000/0.0000	N	--
03	Mitutoyo	0.0000/0.0000	N	--
04	Mitutoyo	0.0000/0.0000	N	--
Global Decimal Accuracy: Float				
Pass-Thru Port: Default				
Special Options: SO,AP				
Enter column and row to change: (e.g. To change Spec Limits on Port 2 = S02)				
Gage Type	=G##	About FlexPort Interface	=AB	
Spec Limits:	=S##	Exit and Save	=EX	
Options	=O##	Exit without Saving	=QU	
Special Options	=SPL	Default Configuration	=CFG	
Decimal Accuracy	=GDA	Pass-Thru Port	=PASS	
Enter Choice:				

FLEXDISPLAY Gage Interface

Main Menu: (See detailed description and application notes)

Gage Type:	G##	(Change gage types)
Spec Limits:	S##	(Set upper and lower specification limits)
Options:	O##	(Port settings)
Pass-Thru Port:	PASS	(Backplane or extra gage input)
Special options:	SPL	(Global settings)
About screen:	AB	(Contact info)
Exit and Save:	EX	(Exit menu)
Exit without Saving:	QU	(Escape any changes)
Default Configuration	CFG	(Factory settings)

The variety of options offered in the FlexDisplay line of interfaces have built in restrictions for features that are contradictory and cannot be used together. Error messages will inform users when attempting to combine non-compatible features.

Gage Type: G##

The Gage Type allows users to select the type of gage connected to the FlexDisplay. Each port can be individually configured to a different gage type, speed, format, etc.

Gage types available:

No Gage

This option will turn off the port and the footswitch jack associated with this port. This will remove the port from being monitored and the reading being displayed or set to the PC.

Mitutoyo

This is the default input type - Mitutoyo Digimatic Code. This output is standard for most Mitutoyo tools and is also compatible with many of our gage cables for other brands as well.

Serial:

This is a customizable driver to decode (parse) incoming data. Each gage input can be configured to match a different output format. This allows different serial devices to be connected side by side in the interface. To configure, users enter the output parameters of the gage and the interface will capture the reading and pass it to the PC. The firmware will walk users through setup by requesting device output format: baud rate, parity, stop and data bits and the End of Record Indicator. Up to 20 numeric fields can be captured and sent to the PC.

Note:

See ***Serial Gage Data Capture*** in the appendix for more details.

Opto-RS232:

This is a special driver to match the Opto-RS232 output offered by Fowler/Sylvac gage types.

Math:

This is a special function that allows the user to define math functions and display the calculated results in real-time. Go/No Go status can also be set for these calculated ports.

The math functions available on the FlexDisplay varies with model. See appendix for math functions for each model. (The more advanced FlexDisplay models has more complex math functions)

FLEXDISPLAY Gage Interface

Spec Limits: S##

This is where upper and lower limits are entered for each port. These limits can be on direct gage inputs or on Calculated/Math ports that are actually computed dimensions.

Master Go/No/Go

You also have the option to include the dimension in the Master Go/No Go. This allows you to get notification on the dimension being measured and send that data to the PC for tracking, but EXCLUDE that dimension from the OVERALL part status. So if a dimension is not critical to pass fail status but is important dimension for quality and manufacturing processes you can track without giving Go/No Go on the floor for the part.

Input Options: O##

These are port specific options that can increase the control over the data collected and/or the process of how the data is collected.

Force output to inches or millimeters

To protect data integrity against output errors, or for gages that do not have the ability to change between inches and millimeters, the interface will force conversion to the desired format.

Note: This is only valid with gages that send indication of original output format.

Change output sign

The interface can flip-flop the gage output from negative to positive or positive to negative.

Set Data Limits

This is a REASONABLE DATA TEST. This limit will test the readings to verify that they are within a set of reasonable limits. If outside of the reasonable limits the Go/No Go status is not calculated and does not effect the overall Master Go/No Go. This is helpful to test that a part is placed in a fixture and verifies that part is placed properly into the fixture before data sending or testing.

Additional limits

These are additional tests for the port. Contact your FlexDisplay representative for additional details on how to maximize use of all limit tests.

Special Options: SPL

The FlexDisplay firmware includes a section of global settings that affect how the interface communicates with the PC.

Note: These settings are NOT changed by the CFG command (return to default mode).

Sequence output (Default is ON)

The FlexDisplay offers control over the flow of readings sent to the PC by allowing readings to be sent sequentially. When this feature is enabled, the inputs are sent in numerical order, lowest ports sent first, then the next highest available port (i.e. Port 1, Port 2, Port 3, etc). When sequence output is turned off, the interface will send data in FIFO format (fastest gages first). This will allow faster data sending, but the order is controlled by the speed of the gages connected. (The default mode is sequence output enabled and seems to work best with most SPC software).

Select output format (Default is Full Output)

The data string sent to the PC is configurable. Different versions of the unit have pre-configured default output settings, but all formats are available regardless of the type of interface unit being used.

FLEXDISPLAY Gage Interface

Count field: 4 digit tally count of readings sent from port
Reading: 10 digit field, including sign (\pm) if required
Mode: 5-character field for special use
ID: 2-digit field for port number, 01 – 99 valid ports

Full Output:

26 character output (Count, Reading, Mode, ID <CR><LF>)(24 characters plus <CR><LF>)

Format: #####,#####,#####,##<CR><LF>

ID, Reading:

15 character output (ID, Reading <CR><LF>)(13 characters plus <CR><LF>)

Format: ##,#####<CR><LF>

Reading Only:

12 character output (Reading <CR><LF>)(10 digit reading plus <CR><LF>)

Format: #####<CR><LF>

MIG Output: (Since only 1 digit for ID, only ports 1-8 are valid)

11 character output. (ID: Plus/Minus Reading<CR>)(#:±7 characters plus <CR>)

Format: #:±#####<CR>

Select baud rate (Default is 9600)

The interface output can be configured to vary from 1200 to 38.4K baud. Default is 9600 baud. This change does not take effect until the configuration has been saved. After this change has been saved, any additional access to the FlexPort menu will be at the new baud rate.

Note: HyperTerminal and any data collection software will need to be changed to match new baud rate.

Data Send Button

There is a data send button on the front panel. This button can be configured to send the port displayed or all ports active. Sending all ports is default.

Pass-Thru Port Settings: PASS

The FlexDisplay family includes an 'extra' port for connecting gages or to backplane units. To backplane units, simply connect the output of one FlexDisplay to the Pass-Thru Port of another and they will instantly be ready to send data. You may stack as many FlexDisplays together as you need (up to 99 inputs).

Default

Ability to hook up multiple FlexDisplays in any combination of 2,4,and 8 inputs up to 99 inputs.

Serial

This is a great 'freebie'. The connector is standard DB9 and allows connection of one additional serial device using standard computer cables (i.e. inexpensive!). Connection for serial gage includes TX, RX and GND lines. (No handshaking lines present, if required, must connect to front panel input ports).

In serial mode, the Pass-Thru Port can capture up to 5 individual numeric fields from a single output. The FlexDisplay will send the readings through as the next available port number. (If 2 FlexDisplays are connected the first unit will be ports 1-4 and the second unit will be ports 5-8).

Global Decimal Accuracy: GDA

The FlexDisplay family can be set to display the resolution level required for a customer's part. You can select to view the reading with 1 to 5 digits of resolution behind the decimal point. Or you can select to FLOAT and that will display the resolution actually sent from the port.

Other Main Menu Options

EX:

Exit setup and save new configuration

QU:

Exit setup *without* saving changes

CFG:

Resets the configuration to the default settings

Note: The CFG command will reset the configuration, with one exception. The exception to this are the SPL settings, these do not change unless they are individually accessed.

AB: Displays information about the FlexDisplay family of interfaces and contact information for Midwest FlexSystems, Inc.

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Feature differences for FlexDisplay Models

The FlexDisplay line offers Math functions that can be configured for incoming data. There are multiple models available and the features offered for Math is one of the biggest differences between models.

	FD-1M FlexDisplay	FD-1PLUS FlexDisplay Plus	FD-1ADV FlexDisplay Plus	FD-2M FlexDisplay 2
Total number of ports with Go/No Go limits	4	8	16	2
# of inputs	4	4	8	2
# of Virtual Ports	-	4	8	-
# of readouts	1	1	1	2
Math functions				
Sum (Add port values)	Between 2 ports	Between 2 ports	Between 2-8 ports	-
Difference (Subtract port values)	Between 2 ports	Between 2 ports	Between 2-8 ports	-
Average (Average between 2 ports)	-	Between 2 ports	Between 2-8 ports	-
Minimum Reading for a port	-	-	Find and display the MIN for a port	-
Maximum Reading for a port	-	-	Find and display the MAX for a port	-
TIR reading for a port	-	-	Find and display the TIR for a port	-
Offset a reading (offset reading by a set amount)	-	-	Add or subtract a constant as an offset	-
Echo reading from another port	-	-	Useful when gages are used for different parts and have different spec limits	-

Host Commands

The FlexDisplay uses various Host Commands to make using the interface as easy as possible. The use of **Host Commands** enable users to control the data sent to the PC from the interface.

Current readings:

To create the most compatible interface on the market, the FlexPort accepts most data send commands used by previous versions and brands of interfaces and SPC software.

Action	Command	Response
Read an input (Ports 1-8)	#<CR>	Will return gage reading on port # (Replace # with 1-8 for desired port)
Read an input (Ports 1-99)	R##<CR>	Will return gage reading on port ## (Replace ## with 2 digit port ID for desired port)
Read an input (Ports 1-99)	!@R##	Will return gage reading on port ## (Replace ## with 2 digit port ID for desired port)
Read a FIELD from NEXT output string	!@R##F##	Will return NEXT reading for port and field selected. R## = port, F## = field (For Serial Gage Types Only)
Read ALL inputs	RG<CR>	Will read all gages connected

Reset the interface

This can be used to reset the interface to a known state. This will also reset the counter for each port that tracks the number of readings sent.

Action	Command	Response
Reset the unit	!@RST	Will reset the CPU of the FlexPort

Pass-Thru Port

The power of the FlexDisplay allows users to connect directly to a serial output device and extract up to 5 numeric fields from a single output string. Each numeric field is captured and available to be sent as a reading for data collection.

There are a wide variety of devices used in data collection, with a single measurement reading being the desired output. But some devices will output multiple numeric fields ...date, time, version #, reading, etc. The FlexDisplay can be configured to send one or all of these fields to the PC.

To setup the Pass-Thru Port you select PASS from the Main Menu.

This will start a quick setup routine to connect to serial gages.

First select the number of numeric fields to capture and send: 1 - 5 readings can be captured. The FlexDisplay will then ask a series of questions regarding the output format of the device:

Enter output settings of device (Communication parameters):

- Baud Rate
- Parity
- Data bits
- Stop bits

Enter the total length of the output including any Carriage Return and Line Feed characters. This is how the FlexDisplay knows that the readings are completed.

Next you enter the character position where the reading starts and then how many characters are in the reading. You enter this for each field you want to capture up to 5 fields.

For example:

Device output:

0001, 12.3456, mm, 03

The desired reading is the 12.3456 so the start is at position 6 ('0001,' are the first 5 characters) and the field is 10 characters long (counting the spaces). This setting will capture the reading and discard everything else in the string.

You have now setup the Pass-Thru Port for a serial device

Default

This is the standard setting and allows interfaces to be stacked and send data to a single PC port. When FlexDisplays or FlexPorts are connected together they work together automatically to send data to the PC. Port numbers are automatically adjusted so that the software can capture and decode which readings came from which gages/devices.

Each Gage Interface includes all cable and power supplies required for connecting multiple units together.

Simply connect the output of one FlexPort or FlexDisplay and connect that to the Pass-Thru Port on another unit. For example: The gage interface connected directly to the PC will be ports 1-4 and the unit plugged into the Pass-Thru Port will automatically become ports 5-8. This can continue until there are 99 inputs.

FlexPort and FlexDisplay stacks can be created from 2, 4, or 8 input units in any combination, up to 99 inputs. There is NO CONFIGURATION NEEDED to setup or remove multiple units.

USB Connection

The FlexDisplay family easily connects to the USB port on your PC. Serial communication is a standard protocol that allows safe and efficient data transfer between devices. The drawback has been the connector size and weight for today's PC's and laptops. The advent of the USB port has created a new process to connect devices and save on space and weight.

We offer a cable that will take the output of the FlexPort and convert it to USB connection for your PC. Since most SPC software, both custom and standard, is designed to read from a serial port, when connected to the PC, the USB cable will create a virtual comport. Data collection continues as before, but now the FlexDisplay is connected to the PC via a virtual comport using the USB port on your PC.

Gage Interface Models

FlexPort Models:

FlexPort FP-2U Universal - 2 inputs plus Pass-Thru Port
FlexPort FP-4U Universal - 4 inputs plus Pass-Thru Port
FlexPort FP-8U Universal - 8 inputs plus Pass-Thru Port

FlexPort FP-4M Mitutoyo Only - 4 inputs plus Pass-Thru Port
FlexPort FP-8M Mitutoyo Only - 8 inputs plus Pass-Thru Port

FlexPort FP-4A Analog – 4 analog inputs plus Pass-Thru Port
FlexPort FP-8A Analog – 8 analog inputs plus Pass-Thru Port

FlexPort FP-1M-RS232 – 1 Mitutoyo input with data send
FlexPort FP-M29 – 1 Mitutoyo input direct to DB9

FlexWedge FW-1M-PS2 – 1 Mitutoyo input to PS/2 keyboard input
FlexWedge FW-1M-USB – 1 Mitutoyo input to USB

Gage Interfaces with built-in Remote Displays

FlexDisplay FD-1M – 4 Mitutoyo inputs to a single readout display
FlexDisplay FD-1PLUS – 4 Mitutoyo inputs and 4 virtual ports to a single readout display
(basic math functions)
FlexDisplay FD-1ADV – 8 Mitutoyo inputs and 8 virtual ports to a single readout display
(advanced math functions)
FlexDisplay FD-2M – 2 Mitutoyo inputs and 2 readouts with Go/No Go status

Additional products, solutions, and support available upon request. Contact Midwest FlexSystems, Inc. or your local MidwestFlex Value Added Reseller (VAR) for details.

Recent Updates

REMOTE ZERO FEATURE

A remote zero command has been added to the FlexDisplay and FlexDisplay Plus.

The following commands are now available on the FD-1 and FD-1 Plus:

Zero a single input - zn<CR>, Zn<CR>, znn<CR>, Znn<CR>, !@znn, !@Znn
where n is a decimal digit and <CR> is a carriage return

Zero all inputs - za<CR>, ZA<CR>, !@za, !@ZA

This feature was added in FD-1 version number 3.95 and FD-1 Plus version number 3.03.

RUNOUT FEATURE (FD-1 PLUS only)

This feature adds the Runout math calculation. There are also provisions for 2 to 4 operands on all math calculations, except for Subtract which is limited to 2.

Math calculations now have two send options: Result Only, and All.

The Result Only selection sends only the result of the calculation. The All selection sends the result as well as all inputs used in the calculation.

Note that the All option is most useful when the Full output format is enabled.

For a math gage type, the calculation ID will always appear in the option field.

The calculation IDs are: SUM, DIFF, AVE, and RUN.

Another enhancement is that Offset is now an option.

If enabled, the Offset is entered as a positive or negative value and gets added to the reading.

This feature was added in FD-1 Plus version number 3.04.